REMARKS

This paper is being provided in response to the Final Office Action mailed May 27, 2005 for the above-referenced application. This response accompanies a Request for Continued Examination (RCE) filed herewith. A Notice of Appeal was filed in the above-referenced application on November 28, 2005. In this response, Applicants have amended claims 1 and 9 to clarify that which Applicants regard as the claimed invention. Applicants respectfully submit that the amendments to the claims are fully supported by the originally-filed specification.

The rejection of claims 1, 2, 4-7, 9, 10, 13 and 14 under 35 U.S.C. 103(a) as being unpatentable over JP 2002-084160 to Yoshihiro (hereinafter "Yoshihiro") in view of GB 1 465 970 to Terayama (hereinafter "Terayama") and the rejection of claims 3, 8, 11 and 12 also under 35 U.S.C. 103(a) are being unpatentable over Yoshihiro in view of Terayama is hereby traversed and reconsideration thereof is respectfully requested in view of amendments to the claims contained herein and the following remarks.

Independent claim 1, as amended herein, recites a surface mount crystal unit having a substrate for surface-mounting, a pair of connecting electrodes disposed on a principal surface of the substrate, a crystal blank have excitation electrodes and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal blank where the opposite sides are fixed to the connecting electrodes by an electrically conductive adhesive, and a ridge corresponding to the end of the crystal blank and disposed on the substrate in spaced relation to the connecting electrodes. The ridge is recited as having a height greater than a thickness of the connecting electrodes. Claim 1 also recites that at least an outer portion of the

ridge is an insulating material having a high bonding strength with respect to the electrically conductive adhesive. The electrically conductive adhesive is applied to the connecting electrodes, a spacing between the connecting electrodes and the ridge, and an upper surface of the ridge, wherein the electrically conductive adhesive is joined to said principal surface of the substrate at said spacing between the connecting electrodes and the ridge. The crystal blank is recited as having an opposite end which remains lifted about the ridge from the principal surface of the substrate under shrinking force of the electrically conductive adhesive. Claims 2-6 depend directly or indirectly from independent claim 1.

Independent claim 7 recites a surface mount crystal unit having a substrate for surface-mounting, a pair of connecting electrodes disposed on a principal surface of the substrate, a crystal blank having excitation electrodes and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal blank where the opposite sides are fixed to the connecting electrodes by an electrically conductive adhesive, and a ridge corresponding to an end of the crystal blank and disposed on the substrate in contact with the connecting electrodes. The ridge is recited as having a height greater that a thickness of the connecting electrodes and being made of an insulating material. The electrically conductive adhesive is recited as being applied to the connecting electrodes and an upper surface of the ridge and a crystal blank has an opposite end which remains lifted about the ridge from the principal surface of the substrate under shrinking forces of the electrically conductive adhesive. Claim 8 depends from claim 7.

Independent claim 9, as amended herein, recites a casing for surface mount crystal unit

having a substrate for surface-mounting a crystal blank, a frame wall laminated on the substrate and having an opening, wherein the substrate and the frame wall jointly define a recess for accepting the crystal blank. A pair of connecting electrodes are disposed on a principal surface of the substrate. A ridge corresponding to an end of the opening is disposed on the substrate in spaced relation to the connecting electrodes and having a height greater than a thickness of the connecting electrodes, wherein at least an outer portion of the ridge is an insulating material having a high bonding strength with respect to electrically conductive adhesive, and wherein the electrically conductive adhesive is joined to said principal surface of the substrate at a spacing between the connecting electrodes and the ridge. Claims 10-14 depend directly or indirectly from independent claim 9.

Yoshihiro discloses a surface acoustic wave device having a substrate (21) for surface-mounting, a pair of connecting electrodes (22, 23) disposed on a principal surface of the substrate, a crystal blank (3) having excitation electrodes (31, 33) and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal, the opposite sides being fixed to the connection electrodes by an electrically conductive adhesive (24) and a bump (5) corresponding to the end of the crystal blank.

The Terayama reference discloses an oscillator including a piezo-electric or electro-strictive oscillator element. The Final Office Action cites principally to Figure 2 of Terayama as disclosing a ridge (31) made of an insulating material.

As set forth in Applicants' claims 1 and 9, the ridge is disposed on a surface of the substrate and spaced in relation to the connecting electrodes and wherein the electrically conductive adhesive is applied to the connecting electrodes, the spacing between the connecting electrodes and the ridge, and an upper surface of the ridge. the electrically conductive adhesive is joined to the principal surface of the substrate at a spacing between the connecting electrodes and the ridge. With this arrangement, as the ridge is spaced from the connecting electrodes, the electrically conductive adhesive is joined to the exposed surface of the substrate made of an insulating material such as ceramics in the spacing, and hence has an increased bonding strength. Consequently, the surface mount crystal unit and case of the presently claimed invention has excellent shock resistance.

Similarly, in Applicants' claim 7, a ridge is disposed on the surface of the substrate in contact with connecting electrodes and the electrically conductive adhesive is applied to the connecting electrodes in an upper surface of the ridge. With this arrangement, the surface mount crystal has excellent shock resistance.

In Yoshihiro, all of the bumps (5) (which the Office Action suggests correspond to the ridges of the presently claimed invention) are disposed on electrode pads (22) (i.e., connecting electrodes). Applicants submit the following translation of paragraph [0030] of Yoshihiro:

> [0030] Strip-shaped bumps 5 extending in shorter side direction of crystal vibrator 3, that is, vertical direction of drawings are formed on electrode pads 22, 23 at the position approaching to the center of cavity portion 20 so that bump 5 opposes to ring-shaped ceramic layer. This bump 5 is formed by, for example, printing conductive resin paste.

Paragraph [0050] and FIGS. 5 and 7 of Yoshihiro illustrate another example. In this example, bumps (5) are formed on electrode pads (22, 23) by application. In FIG. 6, numeral 41 represents conductive adhesive member and numeral 42 represents insulative adhesive member. Therefore, Yoshihiro does not teach the constitute that the bumps (ridges) are disposed on the substrate in spaced relation to the electrode pads (connecting electrodes).

Further, since the ridge is made of a metallic material (which does not effectively bind with the electrically conductive adhesive), no electrically conductive adhesive is applied to an upper surface of the ridge since the electrically conductive adhesive would not strongly adhere to the ridge of Yoshihiro. Thus, Yoshihiro does not show, teach, nor suggest electrically adhesive applied to the upper surface of the ridge and connecting electrodes as presently claimed by Applicants.

Generally, in contrast to the presently claimed invention, Yoshihiro does not show, teach, or suggest the concept that the bonding strength of the electrically conductive adhesive is improved by joining the electrically conductive adhesive to the ridge. This is because Yoshihiro does not disclose the configuration of a ridge, connecting electrodes and electrically conductive adhesive and recited by Applicants and discloses the ridge being made out of metal, which does not adhere especially well to the electrically conductive adhesive. Accordingly, the improved shock resistance obtained by the present claimed invention is not obtained by Yoshihiro.

Furthermore, Appellants respectfully submit that Terayama does not overcome the above-noted deficiencies of the Yoshihiro reference with respect to Appellants' presently

claimed invention. Specifically, as noted above, the Final Office Action cites to Terayama for its disclosure of a ridge made of insulating material. However, Terayama's ridge (31; see Fig. 2), connecting electrodes (18, 19) are not disposed as recited by Appellants. Specifically, Terayama does not disclose connecting electrodes disposed on a principal surface of a substrate. Instead, Terayama's electrodes (18, 19) in Fig. 2 are disposed on pedestals (28, 29). Thus, Terayama's electrodes (18, 19) are not positioned are recited by Appellants and Terayama's ridge (31) does not have a height greater than the thickness of the connecting electrodes. Moreover, Terayama does not disclose application of an electrically conductive adhesive over the ridge and the connecting electrodes and/or over a spacing between the ridge and connecting electrodes. Terayama's ridge and electrode configuration does not structurally address the issue noted by Appellants of achieving lift of a crystal blank away from the principal surface as a result of shrinking forces that occur with the electrically conductive adhesive, and thereby facilitating good electrical characteristics and shock resistance characteristics.

Accordingly, Applicants respectfully submit that neither Yoshihiro nor Terayama, taken alone or in combination, teach or fairly suggest at least the above-noted features as claimed by Applicants. In view of the above, Applicants respectfully request that these rejections be reconsidered and withdrawn.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at (508) 898-8603.

Respectfully submitted,
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